

Tropical Cyclone Report  
Hurricane Jeanne  
13-28 September 2004

Miles B. Lawrence and Hugh D. Cobb  
National Hurricane Center  
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Jeanne produced heavy rain over Guadeloupe, Puerto Rico and the Dominican Republic and caused an estimated 3000 or more deaths in Haiti, from torrential rainfall flooding. Finally, Jeanne hit the northern Bahamas and then the central Florida east coast as a category three hurricane.

a. Synoptic History

Jeanne formed from a tropical wave that moved from Africa to the eastern tropical Atlantic Ocean on 7 September. The wave moved uneventfully across the Atlantic until a tropical depression formed from it on 13 September as it approached the Leeward Islands. Jeanne's best track begins at 1800 UCT on this day and the "best track" chart of the tropical cyclone's path is plotted in Fig. 1. Maximum 1-min. wind speeds and minimum central surface pressure histories are shown in Figs. 2 and 3, respectively. All of the best track data are listed in Table 1.

From 13 to 18 September, the motion was toward the west-northwest at a slow forward speed of 5 to 10 kt, under the steering flow of a subtropical high pressure ridge located to Jeanne's north. The cyclone strengthened to a tropical storm on 14 September while it moved slowly over the Leeward Islands. Continuing west-northwestward, its circulation moved slowly over the Virgin Islands and the center moved inland over southeastern Puerto Rico on 15 September when maximum sustained surface winds reached 60 kt. The center moved across Puerto Rico, then over the Mona Passage and inland at the eastern tip of the Dominican Republic. Jeanne was a hurricane with 70-kt winds while over the Mona Passage and during the Dominican Republic landfall, but then weakened over the rough terrain of Hispaniola. By 1800 UTC on 17 September, the cyclone briefly weakened to a depression and moved over Atlantic waters just north of Hispaniola. On 18 September and in a weakened condition, the low level center moved westward away from the deep convection and dissipated and a new center reformed well to the northeast of the dissipated old center. Jeanne's slow forward motion across the Caribbean motion contributed to torrential rainfall along its path. These rains and resultant fresh-water flooding and mudslides caused thousands to die in Haiti.

While Jeanne was dumping rain over the Caribbean countries, Hurricane Ivan moved over the Gulf of Mexico and inland across the southeastern United States. By 18 September, Ivan's mid-level circulation had combined with an extratropical short wave trough in the westerlies and moved to the northeastern U.S. coast where it eroded the ridge to the north of Jeanne. This placed Jeanne in a weak steering flow that persisted for five days. Jeanne first moved slowly northward over the southeastern Bahamas as a tropical storm and then moved in an anticyclonic loop about 500 n mi east of the northwestern Bahamas. Jeanne gradually strengthened to a hurricane with 85-kt winds by the time it completed this loop on 23 September.

By 23 September, the extratropical trough previously located over the northeastern U.S. coast moved eastward and was replaced by a large deep-layer migratory ridge that propelled Jeanne on a track just north of due westward. On 24 September, Jeanne moved over its own previous track from a few days earlier and encountered cooler waters caused by upwelling from the hurricane. This is believed to be a factor in the decreasing of the maximum winds from 85 kt to 70 kt by 0000 UTC on 24 September. Continuing westward at 10 to 12 kt and moving away from the upwelled cooler water, the winds increased to 100 kt (category three on the Saffir/Simpson hurricane scale) by 1200 UTC on 25 September as the center moved over Abaco Island and then Grand Bahama Island in the northern Bahamas. Jeanne made landfall on the east coast of Florida early on 26 September with the center of its 50-n mi diameter eye crossing the coast at the southern end of Hutchinson Island just east of Stuart at 0400 UTC on 26 September. Maximum winds at landfall are estimated at 105 kt over a very small area north of the center and it is not clear whether these strongest winds reached the coast or remained over water..

Jeanne moved across central Florida while weakening and began to recurve around the western periphery of the migratory ridge mentioned above. The hurricane weakened to a tropical storm while centered about 30 n mi north of Tampa at 1800 UTC on 26 September and then weakened to a tropical depression about 24 h later while moving northward across central Georgia accompanied by heavy rain. The depression, still accompanied by heavy rain moved over the Carolinas, Virginia, and the Delmarva Peninsula. It merged with a frontal zone and became extratropical at 0000 UTC on 29 September while moving eastward off of the U.S mid-Atlantic coast.

#### b. Meteorological Statistics

Wind and pressure observations in Jeanne (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA), as well as flight-level and dropwindsonde observations from flights of the 53rd Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command. Microwave satellite imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT, and Defense Meteorological Satellite Program (DMSP) satellites were also useful. Ship reports of winds of tropical storm force and higher associated with Jeanne are given in Table 2, and selected surface observations from land stations and data buoys are given in Table 3.

Unofficial reports indicate that Jeanne was responsible for 8 to 12 in of rainfall over Guadeloupe and nearby islands.

Jeanne made landfall as a tropical storm around 1600 UTC on September 15 across the southeastern coast of Puerto Rico. The observing site at San Juan Airport recorded a sustained wind of 43 kt and the St. Croix Airport reported a sustained wind of 45 kt. The highest reported storm total rainfall amount over the area was at Camp Garcia in Vieques, which recorded 23.75 in. Generally, total rainfall amounts averaged from 5 to 15 in with some locally higher amounts. This magnitude of rainfall produced major and historical flooding at many river forecast points

within Puerto Rico. The U.S. and British Virgin Islands also experienced heavy flooding as implied by two reports of over 12 in of rain from St. Thomas.

Jeanne produced torrential rains and tropical storm force winds across much of Hispaniola, with the possibility of hurricane force winds over extreme eastern Dominican Republic. Although no rainfall observations are available, some areas of Haiti, especially in Gonaives, were completely devastated from massive flooding and mudslides.

The highest best track estimated 1-min surface winds are 105 kt from 1800 UTC to 0000 UTC on 25 and 26 September. The hurricane was moving across Grand Bahama Island and nearing the Florida east coast during this time. The value of 105 kt is based primarily on aircraft wind speeds of 113 kt measured at a flight level of 700 mb at 1429 UTC on 25 September and again at 0228 UTC on 26 September, reduced to a surface value of 102 kt using a 0.90 reduction factor. This wind speed estimate is for an “over water” wind. The aircraft wind observed at 0228 UTC was at a location about 35 n mi north of the center of the eye and just offshore of the Florida east coast east of Sebastian. It is possible that wind speeds of near 105 kt may have affected a small area of the coastline in the vicinity of Sebastian, although there are no surface observations at the coast to confirm this. In addition, Step frequency microwave radiometer wind measurements of up to 99 kt were obtained from a NOAA aircraft just prior to landfall. Wind speeds of the same magnitude are expected to have also affected portions of Grand Bahama and Abaco Islands.

Table 3 lists several locations that reported hurricane force sustained winds of 64 kt or greater. The highest sustained surface wind reported was 79 kt at the Melbourne NWS office. This was observed at 0818 UTC when the center was about 45 n mi southwest of Melbourne. A measurement of 69 kt was taken on the north shore of Lake Okeechobee by the South Florida Water Management District at 0515 UTC. A C-MAN station at Settlement Point, Grand Bahama Island reported 77 kt at 0000 UTC on 26 September when the center was located about 35 n mi northwest of the station. The observations indicate that a swath of hurricane force sustained winds about 90 n mi wide affected the Florida east coast from near Cape Canaveral southward to near Stuart. The highest wind gust reported from Florida was 111 kt at Fort Pierce Inlet and a 106-kt gust was reported from Vero Beach. Sustained hurricane force winds spread westward and inland about halfway across Florida and tropical storm force winds affected a large portion of the remainder of central Florida.

The minimum surface pressure in Jeanne is estimated at 950 mb at the time of landfall on the Florida east coast. This is based primarily on an observation of 952.9 mb at Ft. Pierce, located 15 to 20 n mi north of where the center crossed the coast. An aircraft-measured 700-mb height of 2653 m at the same time also suggests a surface pressure of about 950 mb, since a 2657 m value a few hours earlier was accompanied by a dropsonde-measured 951 mb surface pressure.

Widespread rainfall of up to 8 in accompanied Hurricane Jeanne as it moved across eastern, central and northern Florida. A narrower band of 11 to 13 in was observed in the vicinity of the eyewall track over Osceola, Broward and Indian River counties of east central Florida. A secondary radar-estimated rainfall maximum of around 11 in was observed over extreme northeast Florida within Duval and Nassau counties. Rainfall amounts of 4 to 7 in accompanied Jeanne across central Georgia and the western portions of the Carolinas and Virginia.

A storm surge of 3.8 ft above normal astronomical tide levels was measured at Trident Pier at Port Canaveral, Florida about an hour after landfall. Storm surge flooding of up to 6 ft above normal tides likely occurred along the Florida east coast from the vicinity of Melbourne southward to Ft. Pierce. On the Florida west coast, a negative storm surge of about 4.5 ft below normal tides was measured at Cedar Key when winds were blowing offshore. This was followed by a positive surge of about 3.5 ft above normal when winds became onshore.

#### c. Casualty and Damage Statistics

According to Reuters News, Haiti's death toll is more than 3,000, including nearly 2,900 in the mud-crusted coastal city of Gonaives. Some 200,000 people in Gonaives lost their homes, belongings and livelihoods in the hurricane. One direct death was reported from Puerto Rico, three direct deaths were reported in Florida, and one direct death was reported from South Carolina. In Puerto Rico, a woman was killed by falling debris from a collapsing home. In Clay County, Florida, a boy was playing outside during high winds and an oak tree limb fell striking him on the head. In Brevard County, Florida, a man was driving his truck onto a flooded road but the flow carried his truck into a drainage canal where the truck then submerged and he drowned. In Indian River County, Florida, an elderly woman was leaving her home to go to a shelter when a door was blown open by wind throwing her to the ground causing fractures. She was hospitalized for her injuries and died a few days later. In Fairfield County, South Carolina, a man died in a tornado on 27 September. In Patrick County, Virginia, a female drowned in a flash flood near her home.

The American Insurance Services group reports that the estimate of insured property losses totaled 3.44 billion dollars. Using a 2 to 1 ratio between insured losses and total damage results in a total U.S. damage estimate of 6.88 billion dollars, which is rounded off to 6.9 billion dollars to avoid suggesting an unrealistic accuracy of the estimate. In fact, this estimate is probably only accurate to within about 25 percent.

#### d. Forecast and Warning Critique

Average official track errors for Jeanne are given in Table 4, along with the average errors for a selection of track guidance models. The average official track errors (with the number of cases in parentheses) are 24 (56), 41 (56), 57 (55), 72 (53), 123 (49), 211 (45), and 328 (41) n mi for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. The 12-72 h errors are considerably smaller than the average official track errors for the 10-yr period 1994-2003 and the 96-h is smaller than the previous 3-yr average. In contrast, the 120 h error is slightly higher than the previous 3-yr average (Table 4). The largest 120-h official track forecast errors were for forecasts made on 16 and 17 September, when Jeanne was moving across Hispaniola. These forecasts failed to capture the turn to the north and subsequent loop that occurred from 18 through 23 September, but instead showed a track directly toward the southeastern United States. There were several global guidance models that had smaller average errors than the official error at 72, 96, and 120 h. Also, the CONU and GUNA consensus models and the FSU superensemble model had smaller average errors than the official forecast at many forecast periods.

Average official intensity errors were 7, 9, 10, 11, 17, 22, and 23 kt for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. For comparison, the average official intensity errors over the 10-yr period 1994-2003 (96 and 120 h averages are for the 3-yr period 2001-2003) are 6, 10, 12, 15, 19, 20, and 21 kt, respectively. In Table 1 and Fig. 2, the wind speed value for 0000 UTC, 24 September, is 70 kt, while the operational wind speed estimate for this time was 85 kt. There was no aerial reconnaissance for 24 hours preceding the operational estimate and the operational estimate was based on satellite Dvorak intensity estimates. However, an aircraft flew into the hurricane shortly after this time and determined that the winds were only about 70 kt. So the 0-h official wind speed error for this time is an overestimate of 15 kt.

Table 5 lists all of the watches and warnings issued for Jeanne. A tropical storm warning for Guadeloupe was issued only 7 h prior to landfall. This short lead time was due to the tropical cyclone forming only 7 h prior to this landfall. A tropical storm warning was issued for Puerto Rico 43 h prior to landfall. A tropical storm warning and hurricane watch were issued for the Dominican Republic 38 h before landfall and a hurricane warning was issued 20 h before landfall. A hurricane watch and warning were issued 44.5 h and 29 h, respectively, before landfall at Abaco Island in the Bahamas. A hurricane watch and warning for the Florida east coast were issued 43 h and 31 h, respectively, before landfall.

*Acknowledgements.* The National Weather Service forecast offices at Jacksonville, Key West, Melbourne, Miami, and Tampa, Florida and San Juan, Puerto Rico and also the Southern Region Headquarters contributed to this report.

Table 1. Best track for Hurricane Jeanne, 13-28 September 2004.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
13 / 1800	15.9	60.0	1010	25	tropical depression
14 / 0000	16.0	60.7	1010	25	"
14 / 0600	16.3	61.5	1009	30	"
14 / 1200	16.4	62.6	1006	35	tropical storm
14 / 1800	16.7	63.5	996	50	"
15 / 0000	17.1	64.0	996	55	"
15 / 0600	17.2	64.8	994	55	"
15 / 1200	17.6	65.4	991	60	"
15 / 1800	18.1	66.2	991	60	"
16 / 0000	18.5	67.1	993	60	"
16 / 0600	18.6	67.8	992	60	"
16 / 1200	18.6	68.5	984	70	hurricane
16 / 1800	18.8	69.0	988	65	"
17 / 0000	19.2	69.4	990	60	tropical storm

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
17 / 0600	19.4	69.9	990	55	"
17 / 1200	19.7	70.7	990	50	"
17 / 1800	20.0	71.6	1002	30	tropical depression
18 / 0000	20.2	72.0	1000	40	tropical storm
18 / 0600	20.4	72.5	1000	45	"
18 / 1200	21.2	72.8	1000	45	"
18 / 1800	21.7	72.3	1005	40	"
19 / 0000	22.2	72.2	1002	40	"
19 / 0600	22.8	72.3	1002	40	"
19 / 1200	23.5	72.5	1000	40	"
19 / 1800	24.2	72.3	996	45	"
20 / 0000	24.8	72.1	994	50	"
20 / 0600	25.5	72.0	992	55	"
20 / 1200	26.6	71.7	989	60	"
20 / 1800	27.2	71.4	984	75	hurricane
21 / 0000	27.4	70.8	982	75	"
21 / 0600	27.6	70.2	972	75	"
21 / 1200	27.6	69.5	972	75	"
21 / 1800	27.4	69.2	972	75	"
22 / 0000	27.2	68.9	972	80	"
22 / 0600	26.8	68.7	968	85	"
22 / 1200	26.5	68.5	968	85	"
22 / 1800	26.2	68.8	967	85	"
23 / 0000	25.7	69.0	966	85	"
23 / 0600	25.5	69.3	966	85	"
23 / 1200	25.5	69.6	966	80	"
23 / 1800	25.8	70.0	966	75	"
24 / 0000	26.0	70.4	966	70	"
24 / 0600	26.1	71.2	969	75	"
24 / 1200	26.2	72.2	969	80	"
24 / 1800	26.4	73.1	968	85	"
25 / 0000	26.4	74.3	964	85	"
25 / 0600	26.5	75.6	960	90	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
25 / 1200	26.6	76.9	957	100	"
25 / 1800	26.9	78.2	952	105	"
26 / 0000	27.1	79.4	951	105	"
26 / 0600	27.3	80.6	953	95	"
26 / 1200	27.7	81.6	965	75	"
26 / 1800	28.3	82.3	970	55	tropical storm
27 / 0000	29.3	82.7	978	45	"
27 / 0600	30.1	83.3	981	40	"
27 / 1200	31.1	83.9	987	35	"
27 / 1800	32.5	83.6	993	30	tropical depression
28 / 0000	33.2	83.2	998	25	"
28 / 0600	34.1	82.4	999	20	"
28 / 1200	35.4	81.0	1000	20	"
28 / 1800	37.3	78.4	999	25	"
29 / 0000	38.3	76.4	999	25	extratropical
29 / 0600	38.8	74.7	999	35	"
29 / 1200	38.5	72.5	999	35	"
29 / 1800	dissipated				
26 / 0400	27.2	80.3	950	105	minimum pressure
14/0400	16.2	61.3	1009	30	landfall at Guadeloupe
15/1600	18.0	66.0	991	60	landfall 15 n mi east of Guayama, Puerto Rico
16/1100	18.6	68.3	985	70	landfall at eastern tip of Dominican Republic
25/1400	26.7	77.3	956	100	landfall at Abaco Island, Bahamas
26/0400	27.2	80.2	950	105	landfall at southern end of Hutchinson Island just east of Stuart, Florida

Table 2. Selected ship reports with sustained winds of at least 34 kt for Hurricane Jeanne, 13-28, September 2004.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed(kt)	Pressure (mb)
15 / 0300	P3NC5	17.3	64.5	060 / 39	1008.3
15 / 1200	P3NC5	17.9	64.7	100 / 49	1008.7
15 / 1500	P3NC5	17.5	64.5	120 / 41	1014.7
16 / 1800	WZJD	22.4	69.6	080 / 37	1014.0
20 / 1800	VRXL6	31.8	75.3	300 / 35	1016.0
21 / 0600	VRXL6	29.3	77.5	300 / 35	1014.0
22 / 2100	KIRF	29.9	67.7	010 / 40	1011.3
23 / 0000	KIRF	30.8	68.4	010 / 40	1013.8
24 / 1700	DGNB	27.3	79.8	*** / 70	1013.5
24 / 2100	WZJC	30.1	74.1	050 / 37	1008.5
24 / 2300	WZJC	30.1	73.3	080 / 36	1008.5
25 / 0300	WZJC	30.1	72.4	050 / 37	1011.5
25 / 0600	WGJT	29.9	80.1	040 / 38	1010.0
25 / 1100	WBJJ	30.2	78.9	050 / 35	1008.6
25 / 1200	WGJT	29.5	78.2	070 / 44	1004.8
25 / 1700	WBJJ	29.8	77.6	070 / 44	1006.5
25 / 1800	WBJJ	29.7	77.5	080 / 42	1005.7
25 / 1800	A8CF2	30.1	79.1	060 / 44	1009.0
25 / 2300	WBJJ	29.2	76.4	110 / 37	1006.4
26 / 0000	DPLE	25.6	80.0	270 / 45	997.3
26 / 0000	A8CF2	29.5	78.6	060 / 37	1004.0
26 / 0600	WDB944	25.9	79.6	210 / 39	997.0
26 / 0600	KGBE	26.0	88.0	060 / 37	1008.5
26 / 0600	WGYN	31.2	78.9	080 / 35	1008.9
26 / 1200	WDB944	27.8	79.6	160 / 42	996.0
26 / 1200	DPLE	28.9	79.9	110 / 52	1001.2
26 / 1500	WDB944	28.7	79.6	120 / 39	1001.5
26 / 1800	MZNM7	27.6	79.1	140 / 35	1006.0
26 / 1800	WGYN	29.0	79.3	140 / 39	1003.0
26 / 1800	WDB944	29.5	79.6	110 / 41	1003.4
26 / 2100	MZNM7	27.0	79.4	180 / 35	1005.4
26 / 2300	WGYN	28.1	79.7	160 / 38	1000.5
27 / 0000	WGYN	27.9	79.7	170 / 37	1001.5
27 / 0000	KRHX	29.5	80.3	150 / 50	998.9
27 / 0300	KRHX	28.9	80.2	170 / 37	1003.0
28 / 1200	VRWG6	34.2	76.2	200 / 35	1010.0
28 / 1800	VRWG6	33.2	78.0	230 / 41	1007.0
28 / 1800	VDLC	43.8	78.1	040 / 39	
29 / 1200	WGMJ	36.9	72.5	260 / 35	1007.3



Table 3. Selected surface observations for Hurricane Jeanne, 13-28 September 2004

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/time (UTC)	Press. (mb)	Date/time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)			
<b>Florida</b>								
Craig Field (KCRG)	15/1653	999.9	15/1929	37	55			1.23
Cross City (KCTY)	27/0313	982.1	26/2149	39	54			5.51
Daytona Beach (KDAB)	26/1908	993.6	26/1520	45	55			2.31
Fargo (FFPG1)								7.05
Fernandina Beach (NOS)	27/0800	999.4				2.66	9.33	
Fort Lauderdale (KFXE)	26/0200	990.8	26/0053	35	49			0.74
Fort Pierce (KFPR) <sup>e</sup>	26/0413	952.9	26/0215	45	76			
Gainesville (KGNV)	26/2333	985.1	27/0345	38	52			4.90
Jacksonville (KJAX)	27/0011	995.9	27/0013	40	48			4.65
Mayport NAS (KNRB)	26/2338	998.0	27/0004	44	49	2.35	7.83	1.90
Mayport Bar Pilot Station (NOS)	26/2354	998.3				1.94	7.57	
Melbourne (KMLB) <sup>e</sup>	26/0458	986.8	25/2343	52	68			6.04
NAS Jacksonville (KNIP)	26/2355	995.9		44	55			4.16
Ocala Municipal Airport (KOCF)	26/2215	980.0	27/0515	30	44			6.96
Orlando (KMCO)	26/1555	985.1	26/1055	53	67			
Orlando (KORL) <sup>e</sup>	26/0807	994.2	26/0501	34	47			5.40
Palm Beach (KPBI)	26/0200	974.2	26/0153		60			9.10
Pompano Beach (KPMP)	26/0200	989.5	26/0127	40	58			2.62
Sanford (KSFB)	26/1943	988.8	26/1302	46	60			4.37
St. Augustine (KSGJ)	26/2315	997.0	26/1955	42	53			3.16
Tallahassee (KTLH)	27/0808	990.2	27/0601	29	42			1.21
Trident Pier Port Canaveral						3.8		
Vero Beach (KVRB) <sup>e</sup>								5.08
<b>Georgia</b>								
Fort Pulaski (NOS)						2.78	9.14	
Moody AFB (KVAD)								7.18
Savannah (KSAV)	27/2153	1003	27/1640	29	38			0.98
St. Simons Island (NOS)						1.31	9.46	
Valdosta (KVLD)	27/0849	987.8	27/0119	35	45			5.38

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)			
<b>South Carolina</b>								
Charleston (KCHS)	28/0856	1006	28/0622	28	36	1.46	6.90	1.01
Fripps Inlet (NOS)						1.85	8.34	
<b>Buoy/CMAN</b>								
NOAA Buoy 41008	27/1250	1003	27/1450	29	38			
NOAA Buoy 41010	25/2200	1000.5	25/2300	33	43			
NOAA Buoy 41012	26/2250	999.4						
NOAA Buoy 42003	26/2050	1004.7	26/0650	23	29			
NOAA Buoy 42036	26/2350	997.6	26/1850	31	41			
Cedar Key (CDRF1)	26/2056	987.6	26/1800	30	40			
Egmont Key (EGKF1)			26/1818	46	55			
Folly Beach (FBIS1)	28/1200	1007	27/1200	27	33			
Lake Worth (LKWF1)	26/0300	974.2	26/0300	52	82			
Port Richey (PTRF1)			26/2130	44				
Settlement Point (SPGF1)	25/2100	961.8	26/0000	77	86			
St. Augustine (SAUF1)	26/2105	995.4	27/0150	48	65			
Tarpon Springs (TARF1)			26/2106	44				
<b>Puerto Rico and Virgin Islands</b>								
San Juan	15/1908	1004.1	15/1734	43	62			5.98
St. Croix Airport	15/0750	1003.1	15/0800	45	54			6.13
St. Thomas Airport	15/0813	1010.2	15/1755	34	44			12.12
<b>Unofficial Observations</b>								
<b>Florida</b>								
Seminole County Mesonet								
STN 22 (28.66N 82.35W)	26/1730	987.8	26/1200		57			5.01
STN 34 (28.82N 82.34W)	26/1900	990.1	26/2030		47			4.52
STN 65 (28.61N 82.19W)	26/1600	988.6	26/1104		49			
SFWMD S65DWX 27.31N 81.02W			26/0545	45	88			
SFWMD L001 <sup>f</sup> 27.14N 80.79W	26/0700	960.4	26/0515	69	91			
SFWMD L005	26/0645	974.4	26/0808		82			
SFWMD L006	26/0615	974.9	26/0646		79			

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/time (UTC)	Press. (mb)	Date/time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)			
SFWMD LXWS			26/0334		77			
Ashburn (ASHG1)								5.65
Bell 4WNW (BLLF1)								6.90
Fort Pierce Inlet 27.48N 80.3W			26/0528		111 <sup>g</sup>			
Jensen Beach 27.26N 80.23W					91			
Juno Beach 26.875N 80.070W	25/2250	959.6	25/2235	34	62			
Kenansville Automated Weather Network (FAWN)								11.97
Lakeland (LAKG1)								8.59
Lakeland (south)	26/1500	968	26/1100		71 <sup>e</sup>			8.09
Live Oak (LVOF1)								10.88
Mayo (MAYF1)								7.60
NASA Wind Tower 1 <sup>h</sup> (28.43N 80.57W)			26/0340	39	73			
NASA Wind Tower 19 <sup>h</sup> (28.74N 80.7W)			26/0745	50	68			
NASA Wind Tower 22 <sup>h</sup> (28.8N 80.74W)			26/1855	50	66			
NASA Wind Tower 1007 <sup>h</sup> (28.53N 80.77W)			26/0955	50	72			
NWS Melbourne			26/0818	79				6.12
Ocilla (OCIG1)								5.60
Palm Bay COOP			26/0819		74			8.93
Port Canaveral USCG			26/0610		76			
Port St. Lucie	26/0424	953.7	26/0213	49	74			
Sebastian Florida Coastal Monitoring Program			26/0647	71	88			
Sebastian					92 <sup>e</sup>			
Sebastian 27.805N 80.482W Memory Makers, Inc.	26/0235	971.4	26/0400	71	79			
Port St. Lucie Automatic Position Reporting Station CW0572 (APRS)	26/0424	953.7						
Tifton (TFTG1)								8.98
Vero Beach KF4PKB (APRS)	26/0625	965.5						
Vero Beach (FCMS)			26/0417	68	106			

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)			
Wimauma (4 mi. SW)		984	26/1524	48	70			2.58
<b>Georgia</b>								
Homerville Ga. Automated Environmental Monitoring Network (GAEMN)								8.22
Nahunta (GAEMN)								4.54
Rocky Ford								3.19
<b>Puerto Rico</b>								
Aibonito 1S (ALPP4)								18.67
Cayey Spotter			15/1425		63			
Corozal Alert gage (ZDBP4)								14.25
Hapenny Beach			15/1230		54			
Jayuya RG nr Bo. Saliente (JAZP4)								14.80
Lago De Matrullas - Orocovis (OROP4)								15.28
Queb. Blanca nr San Lorenzo (SLGP4)								14.84
Rio Icacos nr Naguabo (NGIP4)								18.44
Rio Mameyes nr Sabana (MSAP4)								17.09
Rio Matrullas Alert gage (ZDDP4)								15.20
Rio Turabo abv Borinquen (CAKP4)								14.22
Vieques – Camp Garcia (WVEP4)								23.75
<b>Virgin Islands</b>								
Charlotte Amalie, St. Thom. USVI (XTCP4)								12.77
Maria Hill Spotter St. Croix	15/1156	995.8	15/1150		83			7.65
St. Croix east end	15/0746	1007.8	15/0616		63			4.99
Turpentine Run, St. Thom. USVI (XTFP4)								12.09
<b>Guadeloupe</b>								
Southwestern Guadeloupe								7+
Marie-Galante								12+

- <sup>a</sup> Date/time is for sustained wind when both sustained and gust are listed.
- <sup>b</sup> Except as noted, sustained wind averaging periods for C-MAN and land-based ASOS reports are 2 min; buoy averaging periods are 8 min.
- <sup>c</sup> Storm surge is water height above normal astronomical tide level.
- <sup>d</sup> Storm tide is water height above National Geodetic Vertical Datum (1929 mean sea level).
- <sup>e</sup> Wind equipment failed during or prior to the height of the storm
- <sup>f</sup> Anemometer height 28 ft AGL
- <sup>g</sup> Davis Weather Wizard II anemometer 36 ft AGL
- <sup>h</sup> Anemometer height 54 ft AGL

Table 4. Track guidance model preliminary forecast evaluation (heterogeneous sample) for Hurricane Jeanne, 13-28 September 2004. Forecast errors (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage, but does not include the extratropical stage, if any.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	33 (56)	72 (56)	121 (55)	186 (53)	326 (49)	461 (45)	582 (41)
GFNI	34 (54)	64 (53)	91 (52)	109 (49)	134 (44)	<b>202 (40)</b>	349 (36)
GFDI	28 (56)	50 (56)	66 (55)	75 (53)	137 (49)	264 (45)	424 (41)
GFDL	31 (56)	50 (56)	67 (55)	73 (53)	<b>118 (49)</b>	228 (45)	383 (41)
GFDN	35 (54)	62 (54)	90 (52)	107 (49)	129 (44)	<b>186 (40)</b>	<b>300 (36)</b>
GFSI	26 (55)	41 (55)	63 (54)	89 (52)	166 (48)	295 (44)	476 (40)
GFSO	32 (57)	42 (57)	58 (55)	78 (53)	145 (49)	257 (45)	428 (41)
AEMI	29 (55)	48 (55)	66 (54)	89 (52)	171 (48)	302 (44)	454 (40)
NGPI	33 (56)	60 (56)	82 (55)	107 (53)	155 (49)	226 (45)	373 (41)
NGPS	39 (57)	64 (57)	87 (55)	112 (53)	154 (49)	<b>207 (45)</b>	<b>325 (41)</b>
UKMI	33 (53)	63 (53)	87 (52)	104 (50)	140 (46)	248 (42)	429 (38)
UKM	42 (28)	63 (28)	92 (27)	113 (26)	132 (24)	<b>200 (22)</b>	344 (20)
A98E	32 (56)	58 (56)	78 (55)	110 (53)	214 (49)	391 (45)	604 (41)
A9UK	35 (28)	65 (28)	87 (27)	113 (26)	184 (24)	999 ( 0)	999 ( 0)
BAMD	30 (56)	51 (56)	72 (55)	92 (53)	171 (49)	312 (45)	522 (41)
BAMM	33 (56)	49 (56)	68 (55)	88 (53)	179 (49)	330 (45)	495 (41)
BAMS	45 (56)	78 (56)	106 (55)	129 (53)	224 (49)	364 (45)	510 (41)
CONU	26 (56)	44 (56)	59 (55)	<b>69 (53)</b>	<b>101 (49)</b>	<b>195 (45)</b>	348 (41)
GUNA	24 (53)	41 (53)	<b>53 (52)</b>	<b>65 (50)</b>	<b>103 (46)</b>	<b>202 (42)</b>	360 (38)

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
FSSE	<b>23 (52)</b>	42 (52)	<b>50 (51)</b>	<b>65 (49)</b>	<b>107 (45)</b>	<b>199 (41)</b>	355 (37)
OFCL	24 (56)	41 (56)	57 (55)	72 (53)	123 (49)	211 (45)	328 (41)
NHC Official (1994-2003 mean)	44(3172)	78 (2894)	112 (2636)	146 (2368)	217 (1929)	248 (421) (2001-03 mean)	319 (341) (2001-03 mean)

Table 5. Watch and warning summary for Hurricane Jeanne, 13-28 September 2004.

Date/Time (UTC)	Action	Location
13/2100	Tropical Storm Warning Issued	Puerto Rico and U.S. Virgin Islands
13/2100	Tropical Storm Watch Issued	British Virgin Islands, Saba, St. Eustatius and St. Maarten
14/0900	Tropical Storm Watch changed to Tropical Storm Warning	Saba, St. Eustatius and St. Maarten
14/1500	Tropical Storm Watch changed to Tropical Storm Warning	British Virgin Islands
14/1500	Tropical Storm Warning Issued	St. Kitts and Nevis
14/1500	Tropical Storm Watch Issued	Anguilla
14/1630	Tropical Storm Watch Issued	Cabrera to Isla Saona Dominican Republic
14/2100	Tropical Storm Warning changed to Hurricane Warning	Puerto Rico and U.S. Virgin Islands
14/2100	Hurricane Watch and Tropical Storm Warning Issued	Cabrera to Santo Domingo Dominican Republic
14/2100	Tropical Storm Warning Discontinued	Saba, St. Eustatius and St. Maarten
15/1500	Hurricane Watch/Tropical Storm Warning changed to Hurricane Warning	Cabrera to Isla Saona Dominican Republic
15/1500	Hurricane Watch and Tropical Storm Warning extended westward	Cabrera to Puerto Plata Dominican Republic
15/1500	Hurricane Watch Issued	British Virgin Islands
15/2100	Hurricane Watch Issued	Southeastern Bahamas including Acklins and Crooked Islands, Inaguas, Mayaguana, Ragged Island, Turks and Caicos
15/2100	Tropical Storm Warning discontinued	St. Kitts and Nevis
15/2100	Hurricane Warning changed to Tropical Storm Warning	U.S. Virgin Islands
16/0300	Hurricane Warning extended westward	Cabrera to Puerto Plata Dominican Republic
16/0300	Hurricane Watch and Tropical Storm	Puerto Plata to Monte Cristo Dominican

<b>Date/Time (UTC)</b>	<b>Action</b>	<b>Location</b>
	Warning Issued	Republic
16/0300	Hurricane Warning changed to Tropical Storm Warning	Puerto Rico
16/0300	Tropical Storm Warning/Hurricane Watch discontinued	British Virgin Islands
16/0300	Tropical Storm warning discontinued	U.S. Virgin Islands
16/0900	Tropical Storm Warning discontinued	Puerto Rico
16/1500	Hurricane Watch changed to Hurricane Warning	Southeastern Bahamas including Acklins and Crooked Islands, Inaguas, Mayaguana, Ragged Island, Turks and Caicos
16/1500	Hurricane Watch Issued	Central Bahamas including Cat Island, Exumas, Long Island, Rum Cay and San Salvador
16/1500	Tropical Storm Warning Issued	Le Mole St Nicholas Haiti to Puerto Plata Dominican Republic
16/2100	Hurricane Warning changed to Tropical Storm Warning	Puerto Plata to Isla Saona Dominican Republic
16/2100	Hurricane Watch discontinued	Monte Cristo to Puerto Plata....Isla Saona to Santo Domingo Dominican Republic
17/2100	Tropical Storm Warning discontinued	Le Mole St Nicholas Haiti to Santo Domingo Dominican Republic
17/2100	Hurricane Warning changed to Tropical Storm Warning	Southeastern Bahamas including Acklins and Crooked Islands, Inaguas, Mayaguana, Ragged Island, Turks and Caicos
17/2100	Hurricane Watch changed to Tropical Storm Watch	Central Bahamas including Cat Island, Exumas, Long Island, Rum Cay and San Salvador
19/1000	Tropical Storm Warning discontinued	Southeastern Bahamas including Acklins and Crooked Islands, Inaguas, Mayaguana, Ragged Island, Turks and Caicos
19/1000	Tropical Storm Watch discontinued	Central Bahamas including Cat Island, Exumas, Long Island, Rum Cay and San Salvador
23/0900	Tropical Storm Watch Issued	Central Bahamas including Cat Island, Exumas, Long Island, Rum Cay and San Salvador
23/1730	Hurricane Watch Issued	Northwest Bahamas
24/0900	Hurricane Warning Issued	Northwest Bahamas: Abacos, Andros Island, Berry Islands, Bimini, Eleuthera, Grand Bahama Island and New Providence
24/0900	Hurricane Watch Issued	Florida City to St. Augustine, Florida
24/0900	Tropical Storm Warning Issued	Central Bahamas: Cat Island, Exumas, Long Island, Rum Cay and San Salvador
24/2100	Hurricane Watch changed to Hurricane Warning	Florida City to St. Augustine, Florida including Lake Okeechobee

<b>Date/Time (UTC)</b>	<b>Action</b>	<b>Location</b>
24/2100	Hurricane Watch Issued	St. Augustine, Florida to Altamaha Sound, Georgia
24/2100	Tropical Storm Watch Issued	Florida City to Anclote Key, Florida including the Florida Keys north of the Seven Mile Bridge
25/0900	Tropical Storm Watch changed to Tropical Storm Warning	East Cape Sable to Anclote Key, Florida
25/0900	Tropical Storm Watch extended northward	Anclote Key to Ochlockonee River, Florida
25/1500	Tropical Storm Warning Issued	St. Augustine, Florida to Altamaha Sound, Georgia
25/1500	Tropical Storm Warning extended northward	Anclote Key to Suwanee River, Florida
25/1500	Hurricane Watch Issued	Englewood to Suwanee River, Florida
25/2100	Tropical Storm Warning extended northward	Suwanee River to Ochlockonee River, Florida
25/2100	Tropical Storm Warning discontinued	Central Bahamas: Cat Island, Exumas, Long Island, Rum Cay and San Salvador
26/0300	Tropical Storm Warning extended westward	Ochlockonee River to Indian Pass, Florida
26/0300	Hurricane Warning changed to Tropical Storm Warning	Abacos, Island, Berry Islands, Bimini and Grand Bahama Island
26/0300	Hurricane Warning discontinued	Andros Island, Eleuthera and New Providence
26/0900	Hurricane Warning Issued	Englewood to Suwanee River, Florida
26/0900	Tropical Storm Warning extended northward	Indian Pass to Destin, Florida
26/0900	Hurricane Warning discontinued	Hallandale to Florida City, Florida
26/0900	Tropical Storm Warning discontinued	Florida City to Chokoloskee, Florida including the Florida Keys north of the Seven Mile Bridge
26/0900	Tropical Storm Warning discontinued	Northwest Bahamas: Abacos, Island, Berry Islands, Bimini and Grand Bahama Island
26/1300	Hurricane Warning discontinued	Hallandale to Deerfield Beach, Florida
26/1500	Hurricane Warning discontinued	Deerfield Beach to Jupiter Inlet, Florida
26/1500	Hurricane Watch discontinued	St. Augustine, Florida to Altamaha Sound, Georgia
26/1800	Hurricane Warning discontinued	Jupiter Inlet to Cocoa Beach, Florida
26/1800	Hurricane Warning changed to Tropical Storm Warning	Cocoa Beach to St. Augustine, Florida including Lake Okeechobee
26/1800	Hurricane Warning changed to Tropical Storm Warning	Englewood to Suwanee River, Florida
26/1800	Tropical Storm Warning discontinued	Chokoloskee to Bonita Beach, Florida



<b>Date/Time (UTC)</b>	<b>Action</b>	<b>Location</b>
26/1800	Tropical Storm Warning discontinued	Bonita Beach to Englewood, Florida
27/0300	Tropical Storm Warning discontinued	Apalachicola to Destin, Florida and Englewood to Anclote Key, Florida
27/0900	Tropical Storm Warning extended northward	Altamaha Sound, Georgia to Santee River, South Carolina
27/0900	Tropical Storm Warning discontinued	Cocoa Beach to Flagler Beach, Florida
27/1500	Tropical Storm Warning discontinued	Anclote Key to Apalachicola, Florida
27/1800	All coastal warnings discontinued	

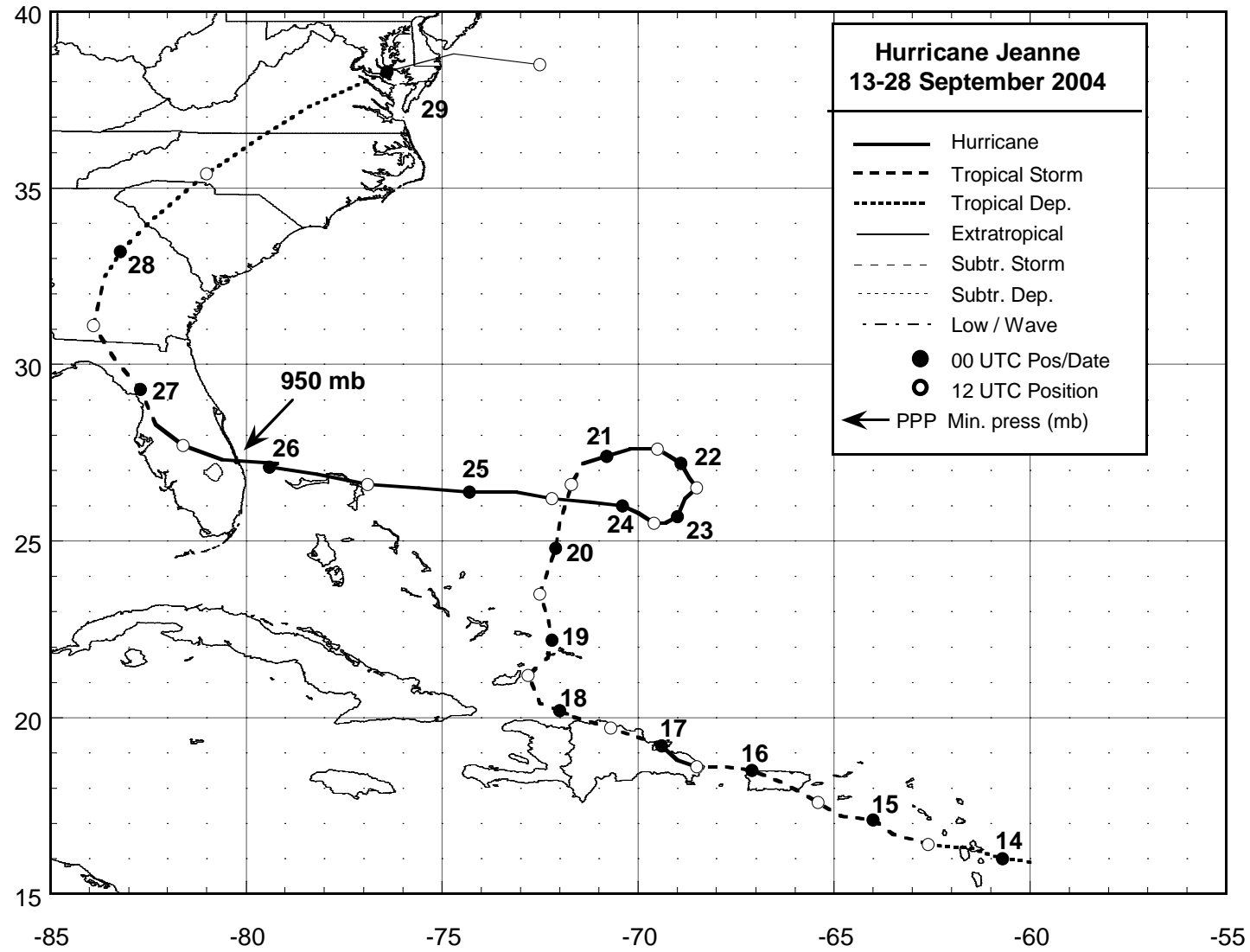


Figure 1. Best track positions for Hurricane Jeanne, 13-28 September 2004.

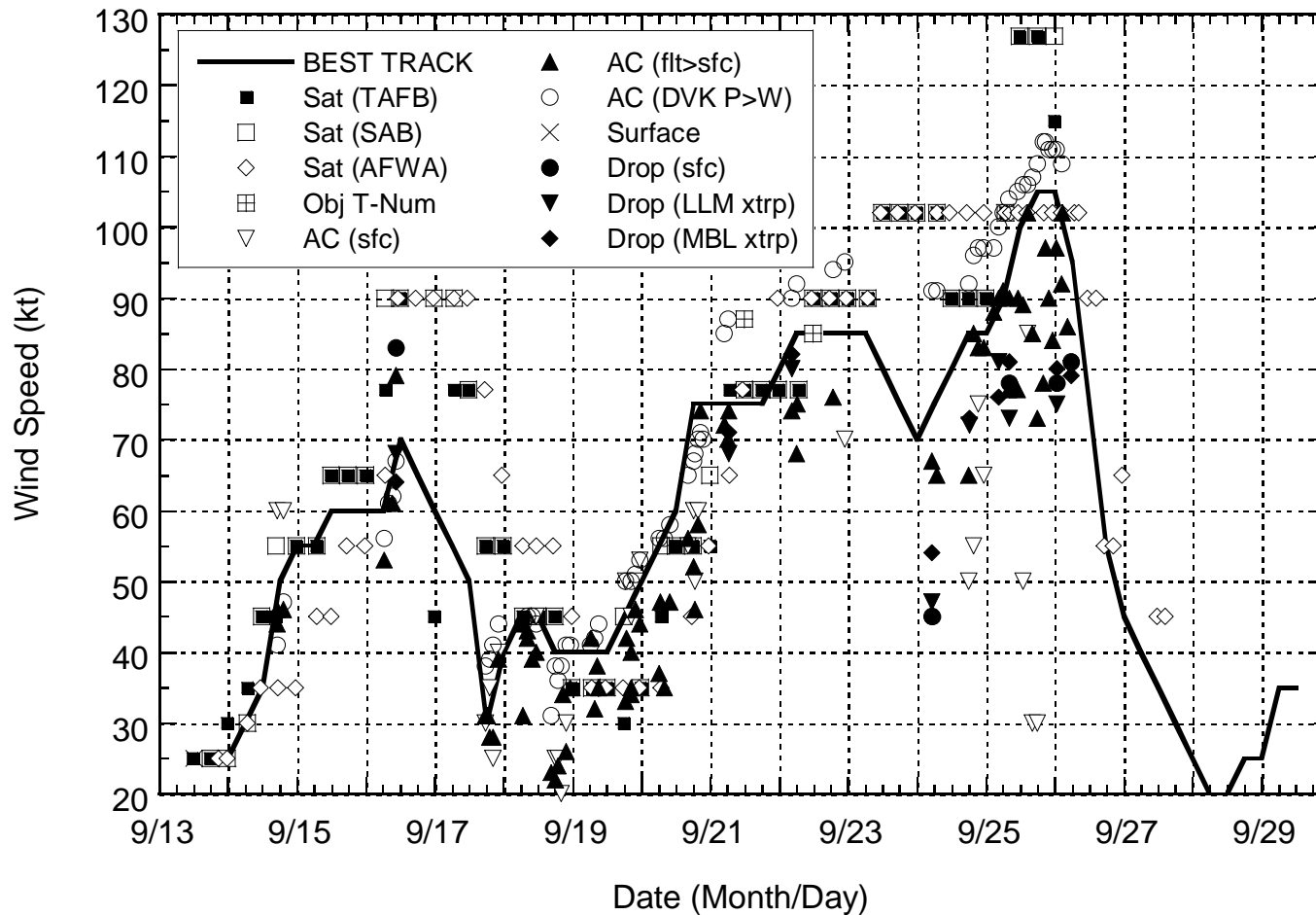


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Jeanne, 13-28 September 2004. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% reduction factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Dropwindsonde observations include actual 10 m winds, as well as surface estimates derived from the mean wind over the lowest 150 m of the wind sounding (LLM), and from the sounding boundary layer mean (MBL). Objective Dvorak estimates represent linear averages over a three-hour period centered on the nominal observation time.

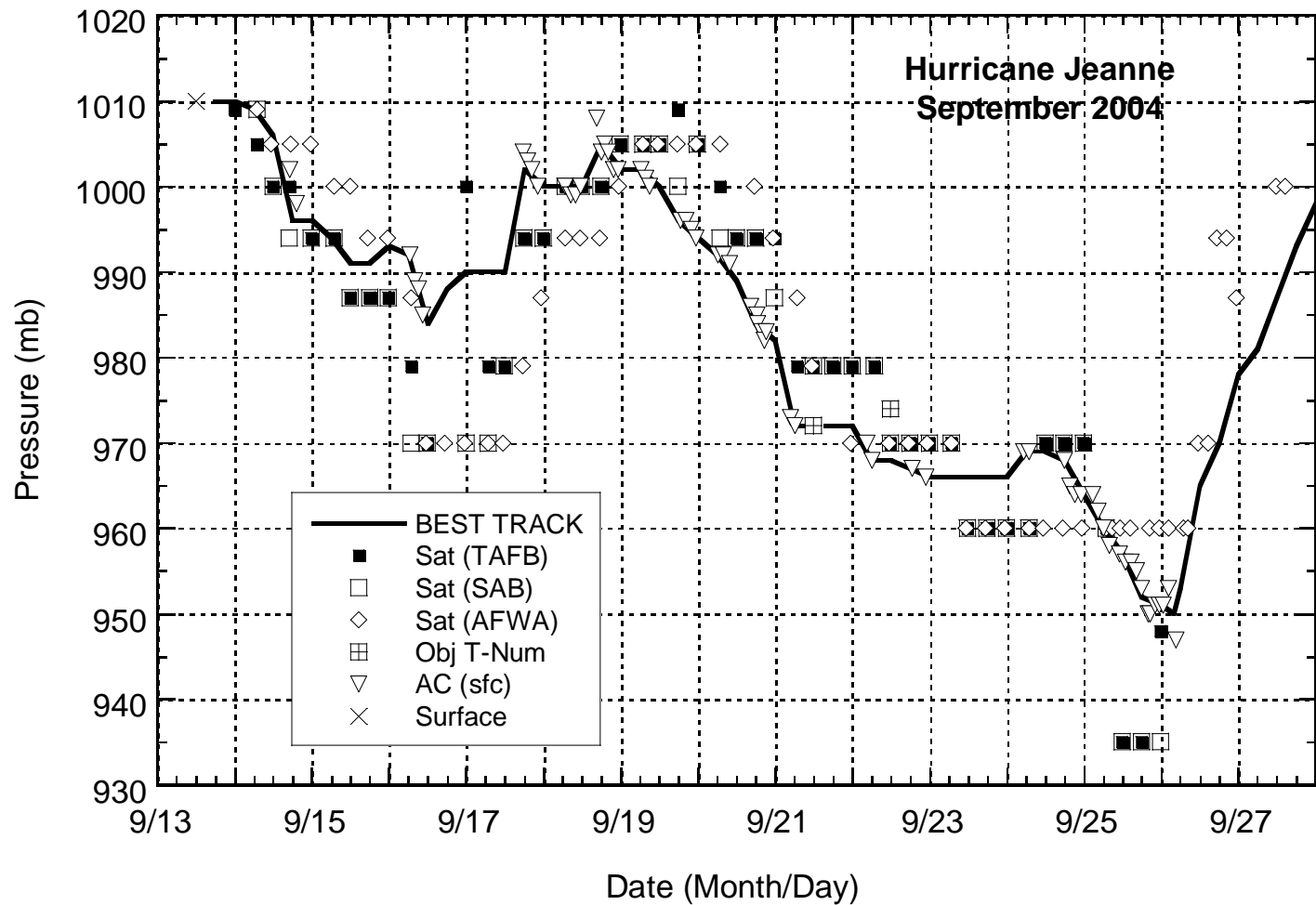


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Jeanne, 13-28 September 2004.